L5: Entry 7 of 11 File: USPT Mar 3, 1998

DOCUMENT-IDENTIFIER: US 5722912 A
TITLE: Lock-up control system for automatic transmissions

Detailed Description Text (78):
Further, the desired engine rotational speed is set at the steps S101 and S103 such that it increases when the vehicle is descending a slope, whereby the difference DNLC is increased at the step S104 to increase the control duty ratio DOUT, thereby increasing the engaging force of the lock-up clutch. This makes it possible to more effectively apply engine brake. The descent-detecting method according to the embodiment makes it possible to detect traveling on a gentle and long descent which the prior art could not detect, as will be described hereinafter. Therefore, engine brake can be effectively applied while the vehicle is descending such a gentle and long slope, as well. Further, when the engine rotational speed NE exceeds a predetermined reference value under these traveling conditions of the vehicle, it is normally determined that the engine is in a fuel cut region, which enables fuel cut to be carried out with an increase in the engine rotational speed, thereby also attaining reduced fuel consumption.

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L5: Entry 8 of 11 File: USPT Feb 10, 1998

DOCUMENT-IDENTIFIER: US 5716301 A
TITLE: System for determining a gear ratio change for an automatic transmission

Brief Summary Text (12):
In an advantageous embodiment of the invention, it is provided that the path data of the map-supported navigation system represents at least the horizontal gradient and/or the vertical gradient of the roadway to be traveled by the vehicle within a specific time. From the evaluation of the horizontal gradient or the vertical gradient of the roadway traveled by the vehicle, it is possible to detect a descent or an ascent or a curve lying ahead of the vehicle in the driving direction. In this way, a reliable activation of a curve program or downhill program, known from the state of the art, is realized with an adaptive transmission control.

Brief Summary Text (14):
Furthermore, and according to the invention, an ascent or descent is detected starting from the vertical gradient and, a change of the transmission gear ratio to a higher transmission gear ratio is prevented as reaction to such an uphill/downhill travel. To detect the ascent, and in an advantageous embodiment, a variable is formed which represents the ascent of the roadway to be traveled and is compared to a threshold value. This embodiment affords the advantage that upshifting operations are prevented especially for downhill travel of the vehicle. Such upshifting operations lead to an unintended increase of the driving speed. Likewise, for uphill travel, unintended upshifting operations are suppressed by the detected ascent.

L5: Entry 3 of 11 File: USPT May 25, 1999

DOCUMENT-IDENTIFIER: US 5906650 A
TITLE: Descending grade condition detecting apparatus

Abstract Text (1):
A descending grade condition detecting system which can accurately detect a descending grade such as a snow-packed road or the like where slippage is likely determines whether permission has been granted to perform descending grade determination. If so, it determines whether established vehicle body deceleration is 0.3 G or less. If so, the system determines whether a road surface at each of the wheels is low .mu. corresponding to a snow-packed road or the like. If estimated vehicle body deceleration is small and of comparatively high .mu., descending grade condition flags KF are set for the respective wheels for which determination thereof has been made to indicate that a condition of a road being traveled is a condition of a low .mu. descending grade of a snow-packed road or the like.

Brief Summary Text (17):
That is, according to this invention, a condition of a descending grade road can be detected based on a road friction coefficient and estimated vehicle body deceleration obtained from information relating to vehicle body speed. In this way, the system can detect a descending grade condition of a low .mu. descending grade of a road surface having a road surface .mu. which is less than or equal to a pressed snow road surface, for example a mirror-surface road, based on estimated vehicle body deceleration and a road friction coefficient.

Brief Summary Text (25):
In this way, the system performs determination wherein estimated vehicle body deceleration is a predetermined value or less and a road friction coefficient is a predetermined value or more, and so it can accurately detect a descending grade condition having the low friction coefficient of a snow-packed road or the like.

Brief Summary Text (27):
Also, it is preferable that an average value of estimated vehicle body deceleration during a predetermined period is utilized as estimated vehicle body deceleration, and so accuracy of estimated vehicle acceleration is improved, and, due thereto, accuracy of detection of a descending grade condition is also improved.

Brief Summary Text (29):
It is also preferable that brake control of the vehicle is performed based on a descending grade condition determined by the descending grade condition detecting apparatus, and so, for example, anti-skid control or the like can be favorably performed. Also, it is possible that brake hydraulic pressure is regulated on a side wherein vehicle wheel braking force increases and anti-skid control is performed when a condition of a descending grade of low friction coefficient of packed snow or the like has been detected by the descending grade condition detecting apparatus.

Detailed Description Text (17):
Information on whether the road is a descending grade susceptible to slippage such as a snow-packed road or the like, detected by the descending grade condition detecting unit A7a based on the foregoing established vehicle body deceleration and height of road .mu. is output to a control compensating unit A7f.

Detailed Description Text (79):

A second preferred embodiment of the present invention detects a descending grade condition relating not to the wheels but rather to an entire vehicle, and performs detailed anti-skid control based thereon. Description of portions similar to the above-described first embodiment will be omitted or abridged.

Detailed Description Text (97):
In particular, according to this embodiment, when detecting a descending grade condition relating to an entire vehicle, a low .mu. descending grade of a snow-packed road or the like is determined to exist only when a mean value of estimated vehicle body deceleration is a predetermined value or less and a condition of a comparatively high .mu. road exists for the left-hand and right-hand wheels, and so an advantage exists where detection of a detailed descending grade condition can be performed.

CLAIMS:

1. A descending grade condition detecting apparatus comprising:

wheel speed detecting means for detecting information relating to vehicle wheel speed subsequent to reduction of brake hydraulic pressure on wheels of a vehicle and for generating signals representative of said information relating to vehicle wheel speed;

estimated vehicle body deceleration calculating means for calculating estimated vehicle body deceleration based on said signals representative of information relating to vehicle wheel speed;

road friction coefficient calculating means for calculating a road friction coefficient based on said signals representative of information relating to vehicle wheel speed; and

descending grade condition detecting means for detecting a descending grade condition based on said estimated vehicle body deceleration calculated by said estimated vehicle body deceleration calculating means and said road friction coefficient calculated by said road friction coefficient calculating means.

6. A descending grade condition detecting apparatus according to claim 1, wherein said descending grade condition detecting means is for detecting said descending grade condition for each of the vehicle wheels.

10. A descending grade condition detecting apparatus according to claim 9, wherein:

said descending grade condition detecting means is for detecting a condition of a descending grade of low friction coefficient when said estimated vehicle body deceleration calculated by said estimated vehicle body deceleration calculating means does not exceed a predetermined value and said road friction coefficient calculated by said friction coefficient calculating means is at least a predetermined value; and

said brake controlling means is for regulating brake hydraulic pressure on a side of said vehicle where vehicle wheel braking force increases and for performing anti-skid control when a condition of a descending grade of low friction coefficient has been detected by said descending gradient condition detecting means.

11. A descending grade condition detecting apparatus according to claim 9, wherein:

said descending grade condition detecting means is for detecting said descending grade condition for each of the vehicle wheels; and

said brake controlling means is for increasing vehicle wheel braking force and for performing anti-skid control with respect to said vehicle wheels when a condition of a descending grade of low friction coefficient at each vehicle wheel has been detected by said descending gradient condition detecting means.